PASCOE
environmental consulting

Gary A. Pascoe, Ph.D.

Principal

Education

Ph.D., Toxicology, University of California, San Francisco, 1983
B.A., Biology, University of California, San Diego, 1975

Years of Experience

Total – 35+
Pascoe Environmental Consulting – since 2003

Professional Certifications

Diplomate, American Board of Toxicology (DABT), 1998
Registered Environmental Assessor (REA-04198), California EPA

Continuing Education

Environmental Law Education Center
Society of Environmental Toxicology and Chemistry

Professional Societies

Society of Environmental Toxicology and Chemistry (SETAC), Pacific Northwest chapter, past Board of Directors
Air & Waste Management Association (AWMA)
Society for Risk Analysis (SRA)
Society of Toxicology (SOT)

Recent Activities

NEBC 2015, presentation on Vapor Intrusion Modeling
IT3 2105, presentation on Reducing Uncertainty in Mercury Risks

Advisory Boards

Ecological risk, Science Advisory Board, Washington Department of Ecology
Port Townsend Marine Science Center, WA, Board of Directors
Washington State Pesticide Incidence Reporting and Tracking (PIRT) panel, Toxicologist

Dr. Gary Pascoe is a risk assessment specialist, with over 35 years of experience in environmental exposure and risk assessments, public health evaluations, multi-media risk analyses, fate and transport studies, marine and freshwater sediment studies, and risk-based cleanups. Previously, he held positions as Senior Risk Assessor at EA Engineering, Science, and Technology, and Vice President and Technical Director at Environmental Toxicology International. Dr. Pascoe has managed or contributed to a variety of environmental assessments, remediation projects, and permit applications under CERCLA, RCRA, Washington Model Toxics Control Act (MTCA), Oregon DEQ, Clean Water Act, and the Clean Air Act. He has managed multi-year remedial investigation/feasibility (RI/FS) studies and biological monitoring programs for terrestrial, freshwater, and marine sediment sites. He has provided technical expertise in risk assessment and risk management strategies at numerous freshwater and estuarine sites, including the Duwamish River waterway in Seattle, the Puget Sound Naval Shipyard, Columbia River Slough, Upper Columbia River, and Commencement Bay, WA; Portland Harbor, OR; and US Navy, US Air Force, and US Coast Guard projects on a national basis. His publications on human health and ecological risk assessment at the Clark Fork River Superfund site helped inform national risk assessment methodologies.

Dr. Pascoe has provided expert witness testimony and technical support on risks from exposures to dioxins and heavy metals from industrial air emissions and through the marine food chain, and has produced human health risk assessments for hazardous waste sites contaminated with PAHs, dioxins, metals, and chlorinated solvents from a variety of industrial settings. Dr. Pascoe has managed numerous site-specific risk assessments in support of RCRA Part B permits for hazardous waste combustion throughout the midwestern and southern US. He has provided technical reviews of draft Toxicity Profiles for the Agency for Toxic Substances and Disease Registry, reviews for the USEPA Hazardous Waste Identification Rule and the IRIS database, and was invited as a plenary speaker to a Pellston Conference on risk assessment for contaminated wetlands based on project experience in the Rocky Mountains and cypress swamps in the southeastern US.

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Experience

Air Studies / Site-Specific Risk Assessments for Combustion

Uncertainties in Modeling Mercury Risks. Developed a white paper on strategies for reducing uncertainties in modeling health risks associated with mercury releases from burning hazardous waste-supplemented fuel. Focused on alternative parameter sources for mercury air transport modeling, methylation, bioaccumulation, and fish ingestion rates; and alternative analytical models.

Vapor Intrusion Risk Assessment. Performed vapor intrusion modeling for trichloroethylene (TCE), tetrachloroethylene (PCE), and carbon tetrachloride (CCl_4) for an undeveloped property adjacent to a former dry cleaning facility. The Johnson-Ettinger model was used under Washington State and US EPA guidelines to predict indoor air concentrations for comparison against Washington inhalation-based air criteria. Modeling considered potential future building types, footprints, areas, and subfloorings for apartment buildings, as well as groundwater and soil gas migration. Results formed the basis for developing property remediation plans and adjusting building designs.

Review of Indoor Air Risk Assessment Model. Performed a technical review of input parameters for the Johnson-Ettinger indoor air model, and various state regulatory agency recommendations for its use in conducting risk assessments at CERCLA and brownfields sites. The review provided the US Air Force with a technical basis for using the model under differing regulatory programs.

Risk Assessment Support for a Pesticide Formulation Facility. Researched fate and transport data and toxicity values for 180 chemicals for use in human health and ecological combustion risk assessments for a pesticide manufacture facility in the US mid-west. Technical direction on AERMOD air dispersion model design, IRAP model input parameters, protocol, and report.

Human Health Risk Assessment at a "Clean" Refinery. Developed the protocol and performed the risk assessment for local residents and consumers of bison using the IRAP model for a "clean" oil refinery in the Great Plains. Developed the approach for performing air dispersion modeling.

Multipathway Risk Assessments for Cement Plants Burning Hazardous Waste. Project manager of multipathway risk assessments at two cement plants in the southern US in support of RCRA Part B permits to burn hazardous waste, for Holcim (US) Inc. Site-specific protocols, air dispersion modeling, acute health risks, ecological risk assessment for water and sediment, mercury bioaccumulation factors, and back-calculated emission rate goals were generated as part of the assessments.

Derivation of a Mercury Bioaccumulation Factor. A site-specific bioaccumulation factor (BAF) for methylmercury was accepted by EPA to substitute for the national value in the Mercury Report to Congress, for use in a multipathway risk assessment.

Dioxin Emission Controls at Cement Plant Burning Hazardous Waste. Provided technical assistance in developing alternative approaches to controlling dioxin emissions from a cement kiln. Evaluated engineering and chemical processes for dioxin emissions and risk reductions.

Air Dispersion Modeling and Risk Assessments for Cement Plants in Region 7. Project manager and technical direction of air dispersion modeling and multipathway risk assessments in support of a RCRA Part B permits for two cement plants burning hazardous waste in US EPA Region 7.

Multipathway Risk Assessments for Cement Plants Burning Hazardous Waste. Technical direction and oversight on nine screening-level multipathway risk assessments for human health and ecological receptors related to combustion emissions from cement plants.

Memorandum of Understanding, Cement Industry and USEPA. Developed an MOU between the cement industry operating a number of facilities in Region 7 under RCRA Part B interim permits and US EPA Region 7 on technical issues around assessing risks from burning hazardous waste, including interpretation of guidance on receptor identification, bioconcentration factors for PAHs and mercury, and fish consumption rates.

Mercury Biomonitoring at a Cement Plant Burning Hazardous Waste. Manager and technical oversight in the sampling plan design, field sampling effort, and compilation of results of an evaluation of mercury contamination of sediments and biota of fresh water ponds in northern Mississippi, as baseline for a long-term monitoring program for mercury.

Corporate Risk Assessment Policy Support. Provided technical consultation in risk assessment to support policy decisions for a national cement manufacturer with combustion facilities burning hazardous waste.

Review of Health Impacts from Asphalt Hot Mix Plants. Reviewed the human health and water resource impacts of asphalt hot mix plants in preparation for a county board hearing for a citizen's group in Washington.

Environmental Health Impact Study of a Municipal Solid Waste Combustor. Program manager of a five year study of multipathway health risks from a state-of-the-art waste-to-energy facility for the Spokane (WA) Solid Waste Disposal Project. The study included a predictive pre-operational risk assessment based on modeling of emissions and air dispersion and two post-startup assessments based on stack emission measurements and soil and air sampling.

Valdez Air Study Review. Provided technical review of the Valdez Air Health Study for the Regional Citizens' Advisory Council (RCAC), Valdez, AK, funded under the Oil Spill Prevention Act. Review focused on the technical approach and methodology for assessing risks to the residents of Valdez from exposures to benzene released from crude petroleum transfer at the Alyeska Pipeline Terminal.

***All Fired Up* Publication.** Performed a comprehensive review of health effects from use of hazardous waste as supplemental fuel in cement kilns. Review covered chemical toxicity, epidemiology studies, risk assessments of current and abandoned facilities, and a comparison of emissions data with and without hazardous waste supplementation. Environmental Toxicology International, Seattle, WA.

Risk Assessment for a Pesticide Formulation Facility. Assisted on the preliminary human health risk assessment for the FMC Fresno, CA, Pesticide Formulation Facility. Performed toxicity reviews and air dispersion modeling.

Human Health Toxicology and Risk Assessments

Pesticide Incidence, Reporting, and Tracking Panel (PIRT). Served as the Toxicologist member on the multi-agency Washington State PIRT panel for eight years, and provided technical reviews and recommendations on various pesticide exposure issues. He provided risk assessment perspective on the issue of drift of sulfonylurea pesticides from rangeland uses and damage to non-target tree fruit.

Occupational Exposure Level Development. Developed recommended occupational levels for exposures to storage tank nitrosamines and other carcinogens at the Hanford Nuclear Reservation, WA. Exposure estimates incorporated air dispersion modeling and monitoring of tank releases.

Risks from PCB Releases at Sunken Marine Vessels. Reviewed and revised the human health risk assessment in support of the Navy's effort to obtain a risk-based disposal approval from EPA Region 4 of a decommissioned aircraft carrier for use as an artificial reef off the coast of Pensacola, Florida (Ex-ORISKANY). Based on models of leaching and trophic transfer, the assessment evaluated the potential risks to recreational fishers and divers.

Risks from Shellfish Collection and Consumption at a Creosote-Contaminated Bay. Assessed human health risks associated with consumption of shellfish and exposure to sediment during shellfish harvesting from Sequim Bay, Puget Sound, containing creosote-impregnated pilings and PAH releases, for a local tribe. Site-specific shellfish BSAFs were developed for predicting tissue PAHs after piling removal. PAH cancer risks were below 10^{-6} for tribal consumption of shellfish.

Risk Screening at Abandoned Mine Sites. Performed screening-level evaluations of risks associated with recreational exposures, including dermal contact and consumption of fish, to metals at numerous abandoned mine sites in Oregon and Washington for the USFS.

Human Health Assessment for Milltown Reservoir. Project manager of a multi-task human health risk assessment of a metals-contaminated recreational and residential site in Montana for the U.S. EPA Superfund program. The adjacent wetland and uplands were contaminated with mining waste metals. Coordinated workplans and field efforts of federal and state agencies, university researchers, and local regulatory personnel. Exposure media included yard soils, air, drinking water, surface waters, sediments, fish, and wild edible plants. Performed an in-depth review of arsenic carcinogenicity. Assisted with public communication of risk results, presentations to citizens group.

Human Exposure Survey for Milltown, Montana. Manager of a survey of exposure pathways to residents of a small western town at a metals-contaminated wetland site for U.S. EPA. Survey questionnaire focused on types and magnitude of incremental exposures, including ingestion of home-grown produce, game animals, birds, and plants from the local wetland; ingestion of well and surface water; and direct contact with sediments in recreational areas of the wetland.

Landfill Community Health Investigation. Project manager of a health investigation of a landfill receiving pulp and paper mill wastes, in southwest Washington. Provided a review of a community health survey, and assistance on toxicological issues to the county health department and the primary waste generator.

Hazardous Waste Landfill Risk Assessment. Managed a quantitative health risk assessment at a hazardous waste landfill in California. Over 75 chemicals, including volatile and semivolatile organics, metals, and pesticides, were evaluated in three exposure media; performed ground water and air transport modeling.

Reviews of Risk Assessments under TES contracts. Technical reviews of human health and ecological risk assessments at CERCLA and RCRA sites for U.S. EPA Regions 8, 9, and 10. Sites included Rocky Flats, Letterkenny Army Depot, McClellan Air Force Base, the 1990 Bay Road Site, BKK Landfill, Army Defense Depot-Tracy, Teledyne-Wah Chang ore processing facility, Monsanto and Kerr-McGee ore processing facilities, and the Wykoff Wood Treatment facility.

Human Health Risk Assessment for the W.R. Grace Site. Performed the human health risk assessment for the Radioactive Waste Disposal Area of the Curtis Bay facility. Evaluated risks for exposures of construction workers, industrial workers, and visitors to organic chemicals and metals in soils and air. Coordinated exposure scenario development with radiological team.

Ruston Way Site Risk Assessment. Manager and senior author of a human health and ecological risk assessment of an abandoned industrial property to determine soil cleanup levels for PCBs and metals, located along the shoreline of Commencement Bay, WA, for the Washington National Guard.

Risk Assessment for the Big West Oil Refinery. Manager of an assessment of human health risks to residents near an abandoned petroleum refinery in Montana, for the Montana Department of Health and Environmental Sciences. Concerns focused on PAHs and lead in soils, air, and sludge ponds.

Environmental Risk Assessments

Risk Evaluation for Dioxins in Willamette River Sediments. Developed site-specific modifying factors to adjust the Oregon Department of Environmental Quality screening level values (SLVs) for dioxins in sediments. Modifications included adjusting the fraction of contaminated site sediments for fish exposure, developing representative biota-sediment accumulation factors (BSAFs) for dioxin/furan congeners in freshwater finfish, and a fish ingestion fraction for local recreational fishers.

Port Gamble Bay Remedial Investigation. Provided oversight and technical guidance for the final risk assessment for the Port Gamble Bay remedial investigation, including recommendations for an appropriate background data set for dioxins, PAHs, and metals in the sediments; performed under Washington Model Toxics Control Act (MTCA). Served as a subconsultant to the Washington Department of Ecology, following consultation with the Port Gamble S'Klallam Tribe.

Human Health and Ecological Risk Evaluations for Dioxins at a Former Lumber Mill. Evaluated the potential for risks to human and wildlife consumers of fish from a river contaminated with dioxins/furans from a former lumber mill in western Oregon. Performed a critical review of the technical basis for the regulatory screening levels for dioxins in sediment. Evaluated the uncertainty in applying biota-sediment accumulation factors (BSAFs) developed from marine/estuarine bays to modeling fish dioxin uptake in a riverine system.

Ecological Risk Assessments for Munitions Compounds in Sediments. Manager and senior author US Navy Tier 1 and Tier 2 baseline ecological risk assessment (ERA) for a former munitions formulation facility on Puget Sound, WA, as part of the Supplemental Remedial Investigation for the Jackson Park Housing Complex Superfund site. Complied with CERCLA regulations and Washington State Model Toxics Control Act (MTCA) guidelines, including remedial action objectives based on the biological criteria of MTCA. Developed preliminary sediment quality benchmarks (SQBs) for 27 munitions compounds using aquatic toxicity data and equilibrium partitioning. Primary author of data gaps report, work plan for data collection, data reports, and screening and baseline ERAs. Performed data review and compliance with data quality objectives. Sampling and risk assessment plans were negotiated through EPA Region 10 managers and risk assessment staff.

Technical Support for the Lower Duwamish Waterway Remedial Investigation. Provided technical support in risk assessment to Seattle City Light on the Lower Duwamish Waterway Remedial Investigation (RI). Multiple interactions with Washington Department of Ecology and US EPA Region 10 management and technical staff as co-regulatory leaders. Focused on interpretation and integration of Washington Model Toxics Control Act (MTCA) and CERCLA guidelines on risk assessment.

Risk Assessments for Puget Sound Sediment Site. Performed human health and ecological risk assessments for the Lockheed West Seattle Superfund Site, marine sediments contaminated with former shipyard metals, PCBs, and PAHs. The ecological risk assessment followed Sediment Management Standards within the Washington Model Toxics Control Act (MTCA) to comply with both CERCLA and MTCA, which was an ARAR for the site. Tissue concentrations of sediment contaminants for clam, crab, and fish consumption by recreational and tribal fishers and for ecological receptors were estimated by BSAFs and regression modeling developed from regional sediment and tissue data. Developed remedial action objectives, risk-based cleanup levels, and a background dataset for use in setting remedial goals and evaluating alternatives.

Upper Columbia River Data Needs Analysis and Risk Assessment Work Plan. Co-authored a data needs and collection and risk assessment work plan for an Upper Columbia River investigation, for a

local tribe. Potential ecological risks included aquatic and terrestrial habitats, with exposures due to both upstream smelter wastewater discharges to the river and stack releases to air.

Riparian Habitat Ecological Risk Assessment. Performed screening-level ecological risk assessment for a property with riparian area along the Columbia River, Portland, OR.

Ecological Risk Assessment of a PAH-Contaminated Estuarine Bay. Performed a screening-level aquatic ecological risk assessment under Oregon DEQ guidelines for an estuarine bay near the mouth of the Columbia River, where sediments are contaminated with polycyclic aromatic hydrocarbons (PAHs) associated with a previous gas generating plant. Food web models predicted predict PAH concentrations and risks to benthic invertebrates (amphipods), shellfish, demersal and pelagic fish, and aquatic wildlife.

Ecological Risk Assessment at Largest Abandoned Mine Site in Washington Cascades. Evaluated ecological risks to terrestrial and aquatic receptors at the Van Stone mine site in Eastern Washington, one of the largest Model Toxics Control Act (MTCA) sites in the state. Followed Washington Terrestrial Ecological Evaluation (TEE) procedures; developed the risk assessment work plan and identified data gaps to assist in site characterization.

Southwest Harbor Project, Port of Seattle. Manager and senior author of a regional risk assessment for PCBs and metals in soil and groundwater, across four remediation areas (i.e., sites) consisting of multiple industrial sites. Because this project was completed prior to Model Toxics Control Act (MTCA) amendments that allow site-specific risk assessments in Washington, the conceptual exposure analysis was instrumental in receiving Department of Ecology approval to incorporate site-specific information into the risk assessment. Co-developed a risk-based hydrogeologic model to identify groundwater and subsurface soil remedial goals protective of offsite surface water receptors, for metals, PCBs, and PAHs.

Ecological Risk Assessment for the Milltown Reservoir/Clark Fork River Sediments Site. Project manager and primary author of a site-specific ecological risk assessment for the Milltown Reservoir Sediments Site, a metals-contaminated wetland in Montana. Coordinated work plans and field sampling and assessment efforts of USEPA, U.S. Fish and Wildlife Service, university researchers, and state and county agency technical personnel. Risk severity ranking supported natural attenuation as the final selected remedial alternative. The first comprehensive fresh water ecological risk assessment in the Superfund program. Collaborative publication efforts with USEPA helped inform guidance on field methodology for ecological risk assessments.

Critical Review of MTCA Soil Cleanup Level for Phosphorus. Reviewed the regulatory and analytical chemistry basis of the Washington State regulatory soil and groundwater cleanup levels for phosphorus in soil and groundwater at a former nursery. Review established that phosphorus levels were no different from regional background, and that cleanup standards for total phosphorus were erroneously based on white phosphorus toxicity. The current MTCA cleanup level for phosphorus was deemed to be inappropriate for the site, and potential human health risks were re-evaluated using the provisional peer-reviewed toxicity value (PPRTV) for phosphate.

Ecological Risk Assessment for Fluoride. Re-calculated ecological risks for exposures of terrestrial mammals and birds, and livestock, to fluoride in soil, vegetation, and food items. Used updated toxicity values and relative bioaccumulation factors; developed risk-based threshold concentrations in vegetation and soil for protection of multiple wildlife species.

Monitoring Plan for Terrestrial Exposures. Developed a monitoring plan for fluoride in vegetation for a CERCLA/RCRA phosphate facility in Idaho. Station locations based on review of historical

sampling data. Developed the vegetation action level from risk-based concentrations protective of multiple exposure routes for terrestrial wildlife and livestock.

Former Agricultural Site Risk Assessments. Performed screening-level human health and ecological risk assessments for a former farm site near Portland, Oregon, following Oregon DEQ Tier I and Tier II guidelines. Fields, on-site streams, and nearby wetlands were contaminated with organochlorine pesticides and metals, for which risks were estimated for terrestrial and aquatic receptors on and off-site. Human exposures included occupational and on-site farm worker residents.

Abandoned Mine Risk Assessments. Performed screening-level human health and ecological risk assessments for an abandoned lead and zinc mine site in the Cascade Mountains of Oregon. Exposures and risks to terrestrial and aquatic receptors were estimated for streams on and off-site. Macroinvertebrate field collection and data evaluation followed DEQ rapid bioassessment protocol.

Food Web Analysis for Mining Waste Metals. Manager and technical oversight of a food chain analysis of metals contaminants in a montane wetland at Milltown Reservoir, MT. Receptors of concern consisted of eagles, osprey, deer, muskrat, beaver, and various waterfowl species. Database included tissue residues of aquatic and terrestrial plants and terrestrial small mammals. Results were integrated with habitat and wildlife surveys to support natural attenuation of the metals risks.

Risk Screening at Abandoned Mine Sites. Performed screening-level evaluations of risks associated with terrestrial and aquatic wildlife exposures to metals at abandoned mine sites for the USFS.

Hanford Ecological and Radionuclide Risk Assessment. Revised risk assessment components of the RI and FS for one of the hazardous waste sites on the Hanford Reservation. Ecological risks to terrestrial receptors from exposures to radionuclides and non-radionuclides were evaluated through the Washington Model Toxics Control Act (MTCA) terrestrial environmental evaluation (TEE) and Department of Energy screening procedures.

Risk-Based Corrective Action Approach for the Naval Arctic Research Laboratory. Technical assistance in developing a white paper on performing a Risk-Based Corrective Action (RBCA) approach to assessing risks to human health and ecological receptors from total petroleum hydrocarbon (TPH) contamination at the Naval Arctic Research Laboratory, Pt. Barrow, AK.

Risk Assessment for the Naval Arctic Research Laboratory. Manager and primary author of the final ecological and human health risk assessments, feasibility studies, management plans, and proposed plans for two sites at the Naval Arctic Research Laboratory, Barrow, AK. Risks were also calculated for Total Petroleum Hydrocarbon measurements, based on the fractionation and surrogate toxicity approach. Risk-based cleanup levels were developed for human health and ecological receptor exposures to PAHs, metals, chlorinated solvents, and TPH in soil, groundwater, and freshwater and estuarine sediments. Remedial alternatives were developed to achieve the risk-based cleanup levels in an arctic environment. Results of the risk assessments and proposed plans for the sites were presented to regulatory agencies and local citizens groups, including native Alaskan corporations.

Field Testing of Modeling Fish Concentrations in an Arctic Lagoon. Managed a project to collect field data on petroleum hydrocarbons in surface water, sediment, and fish tissue collected from an estuarine lagoon near the Naval Arctic Research Laboratory, Barrow, AK. The measured tissue concentrations were used to calculate health risks in place of estimated concentrations that were modeled from $\log K_{ow}$ values. An extraction methodology was developed with the laboratory to separate petroleum hydrocarbons from naturally occurring fish lipids, and received approval from the regulatory agency prior to field plan implementation.

Surface Water and Sediment Quality

East Waterway Remedial Investigation/Feasibility Study. Provided technical assistance and review comments to the City of Seattle on sampling plans, risk assessments, remedial action objectives, and risk-based cleanup approaches for the East Waterway Superfund site, Seattle, WA.

Prudhoe Bay Risk Assessments. Provides ongoing technical review of human health and ecological risk assessments for tundra soils and surface waters on the Alaska north slope impacted by petroleum industry activities.

Site-Specific Mercury Bioaccumulation. Managed field and laboratory studies and developed site–specific bioaccumulation factors for mercury species in various trophic level fish in a southeast coastal plains wetland. Risks were assessed for consumption of local fish by residents near a cement plant.

Dioxin Exposures at a Pulp and Paper Mill. Provided technical assistance in planning field sampling and chemical analyses, and interpretation of results for dioxins in various environmental media around the pulp and paper mill at Sitka AK.

Risk Assessment at the Bangor Subbase. Technical oversight and revisions to the human health and ecological risk assessments for exposures to groundwater and irrigation water at a naval site contaminated with chlorinated solvents and benzene. U.S. Navy, Engineering Field Activity, NW.

Review of Oregon DEQ Work Plan and Management Plan for Contaminated Sediments. Provided technical review of numerous versions of a work plan and management plan for performing a Remedial Investigation and Risk Assessment of contaminated sediments of the Willamette River. The plans were reviewed on behalf of the Port of Portland prior to listing the site under Superfund.

White Paper on Marine Studies. Task manager on a white paper to review and evaluate existing data on marine sediment studies at the Jackson Park Housing Complex Marine Sediments Site. Critiqued bioassay and chemistry results for site and reference area sediments. Recommendations were made for further studies to finalize the RI and proceed with the FS planning.

Jackson Park Housing Complex/Naval Hospital RI/FS and Proposed Plan. Manager and senior author of a focused RI/FS for the marine operable unit of the Jackson Park Housing Complex/Naval Hospital site on Puget Sound. The RI/FS followed regulatory guidance of both Superfund and the Washington Department of Ecology Model Toxics Control Act (MTCA). Designed remedial action objectives for sediments contaminated with mercury and ordnance compounds that focused on mitigating sediment toxicity to benthic organisms and impacts to benthic ecology. Remedial alternatives were developed using a combination of natural attenuation, thin layer covers, and full capping. A Treatability Study included field studies on sedimentology to calculate deposition rates, sediment transport using the Sediment Trends Analysis to identify offsite sources of contaminated sediment input, and additional site characterization and sediment bioassays to account for ammonia and sulfide impacts. Linked the risk assessment and sediment transport study results to offsite source identification. Modeled natural attenuation to meet cleanup levels with offsite source controls. Primary author of the Proposed Plan and draft Record of Decision.

Keyport Post-ROD Monitoring Program. Project manager of a post-record of decision (ROD) five-year monitoring program for one of two operable units at the Naval Undersea Warfare Division-Keyport site on Puget Sound. Coordinated field and laboratory activities for four remedial areas of the site, and negotiated with state regulators on interpretation of data on volatile and semivolatile compounds, pesticides, and metals in ground water, seeps, intertidal sediments, offshore sediments, and clam tissues.

Pharmaceuticals and Household Products in Urban Sewage. Assisted in identifying and compiling information on pharmaceuticals, household products, and their breakdown products in sewage treatment systems and receiving waters for the City of Victoria, BC. Recommendations on emerging issues regarding pharmaceuticals and household products in the treatment of urban wastewater.

Natural Resource Damage Assessment (NRDA) Review. Provided technical reviews of fish and benthic invertebrate toxicity studies and sediment natural recovery analyses, for the Commencement Bay (WA) Natural Resource Damage Assessment.

City of Charleston Sediment Impacts. Evaluated remedial options to contain contaminated sediments during construction of an aquarium at an estuarine National Park Service site.

Sediment Monitoring Program Toxicity Evaluations. Evaluated sediment toxicity results for the Puget Sound Sediment Monitoring Program of the Washington Department of Ecology. Performed quantitative comparisons with reference area sediments, and covariance analyses with benthic assemblages and sediment chemistry.

Clean Water Act Section 301(h) Permit Application Reviews. Performed technical evaluations of applications to alter National Pollution Discharge Elimination System (NPDES) permits under the Clean Water Act Section 301(h); focused on toxicity tests, bioaccumulation of organic compounds, and fish histopathology.

Los Angeles County CWA 301(h) Permit Review. Managed an assessment of ecological risks due to DDT, PCBs and heavy metal contamination in sediments and biota of a Southern California marine ecosystem as part of a review of a Clean Water Act 301(h) permit application. Evaluated effects of major environmental processes on DDT dynamics in marine sediments and tissues of demersal fish. Generated an empirical model of DDT bioaccumulation in demersal fish from contaminated sediments.

Pesticides of Concern in Puget Sound. Managed an evaluation of the potential for over 120 modern pesticides to pollute Puget Sound waters, sediments, and biota. Conducted usage surveys and environmental fate and toxicity data analyses. A level-of-concern approach was used to prioritize pesticides in a sampling strategy program for U.S. EPA Region 10.

Risk-Based Sediment Storage Management Tool. Managed and designed an approach for generating risk-based chemical concentrations for managing storage of marine sediments during dewatering at the Port of Oakland. Exposures of concern were inhalation and contact with contaminated sediments by workers at the marine terminal.

Reviews of Marine Toxicity Bioassays. Reviewed results of acute and chronic marine toxicity studies of effluent discharges from a number of municipal waste water treatment plants, for U.S. EPA.

Toxicology/Regulatory Studies

Technical Review of TCE. Provided a critical review of the toxicity-based criteria for trichloroethylene (TCE) promulgated by EPA and the states of California and New York, as they apply to vapor intrusion modeling of buildings, for Air Force.

Technical Reviews of ATSDR and USEPA Toxicology and Risk Assessment Guidelines. Performed reviews of risk assessment methods and guidelines for the USEPA hazardous waste identification rule. Continually performs reviews of draft toxicity profiles and chemical risk assessments on behalf of the Agency for Toxic Substances and Disease Registry and the USEPA.

Consumer Products Materials Certification. Performed evaluations of the toxicities of ingredients in art materials and consumer products under the Labeling of Hazardous Art Materials Act.

Environmental Health Reviews of Biodegradable Plastic Ingredients. Managed a comprehensive review of the environmental impacts of select ingredients in a biodegradable plastic, covering environmental fate and transport, toxicity to humans and wildlife, and potential for degradation in the environment, with descriptions of current waste treatment options. Report written for technically trained readers and laypersons.

Review of Arsenic Carcinogenicity. Authored a comprehensive review of the skin cancer of arsenic for U.S. EPA, with a focus on the potential for a threshold based on mechanisms of carcinogenicity and metabolism.

Toxicity Review of an Ordnance Chemical. Reviewed the toxicology and potential health risks of a U.S. Army chemical (diisopropyl-methyl-phosphonate, DIMP), for the State of Colorado. Evaluated exposure studies in animals for appropriateness for predicting human health effects and for determining dose-response relationships. Derived a reference dose and drinking water guidelines.

Consultation on Regulatory Issues. Provided consultation to U.S. EPA Office of Research and Development, the State of Washington, and citizens' groups on technical and regulatory issues regarding municipal wastes, air toxics, pesticide exposures, impacts of municipal solid waste management options, and design of solid waste compost guidelines.

Solid Waste Management Plan. Assistance to the State of Delaware in generating a solid waste management plan. Reviewed facility siting criteria and environmental and health issues on incineration and landfilling options.

Technical Support of Litigation

Litigation Support for Mill Discharges. Provided technical support on potential risks to the marine environment from paper mill discharges of dioxins and metals. Assistance on preparation of sampling program for soils, surface water and sediments of lakes and marine waters, and evaluation of program results.

Broderick Site Expert Witness. Served as expert witness in risk assessment to the Department of Justice for a Superfund hazardous waste site contaminated with PAHs, dioxins, metals, and chlorinated solvents from wood treatment activities.

Review of Deep Well Injection Practices and Regulations. Reviewed a permit application for a deep well injection system at a hazardous waste landfill, for the Department of Justice. The review focused on compliance of the permit application with the USEPA Underground Injection Control program under the Safe Water Drinking Act and RCRA, and on concerns within the scientific community and regulators over deep well injection options.

Litigation Support in Dioxin Risks. Reviewed the U.S. EPA and U.S. FWS assessments of dioxin risks to bald eagles in the Columbia River Basin, for a pulp and paper plant.

Smelter Slag Impacts on Aquatic Biota. Provided testimony on the potential for heavy metals in slag to leach to estuarine and marine waters, and for metals in soils runoff to adversely affect marine biota. Issues focused on the factors that govern the bioavailability of metals to aquatic biota, their potential impacts, and the regulatory history of ambient water quality criteria for metals, and the scientific understanding in the history of water quality regulations and the aquatic toxicity of metals found in smelter slag.

Presentations and Publications

Reducing uncertainties in site-specific risk assessment (SSRA) for mercury. 2015. Plenary presentation. In: *Proceedings of the 2015 International Conference on Thermal Treatment Technologies & Hazardous Waste Combustors*. CP-215-EFS. Air & Waste Management Association. Houston, TX. October.

Vapor Intrusion: Approaches and Models. 2015. Invited presentation. Northwest Environmental Business Council (NEBC) *Re-Using Contaminated Land* conference. Seattle, WA. October 8.

Evaluating risks to terrestrial wildlife from environmental fluoride. Pascoe, G.A., J. Zodrow, and E. Greutert. 2014. *Human and Ecological Risk Assessment* 20:941-961.

Proposed Action Level and Monitoring Plan for Fluoride, Eastern Michaud Flats Superfund Site. 2013. Prepared by Pascoe Environmental Consulting for Booz Allen Hamilton, WA.

Vapor Intrusion Health Risks at a Planned Apartment Complex. 2013. Prepared by Pascoe Environmental Consulting for SoundEarth Strategies, WA.

Munition constituents: Preliminary sediment screening criteria for the protection of marine benthic invertebrates. Pascoe, G.A., K. Krueger, R.J. Feldpausch, and D. Leisle. 2010. *Chemosphere* 81: 807–816.

Preliminary sediment quality benchmarks for munition constituents. Pascoe, G.A., K. Kroeger, R.J. Feldpausch, and D. Leisle. 2010. Presented at SERDP-ESTCP Conference, Washington, DC. December.

Refinements of Biological Test Methods under MTCA. Word, J., W. Gardiner, J. Word, B. Hester, T. Schus, G. Pascoe, K Kroeger, C. Whitmus, and P. Adolfson. 2010. Presented at SMARM, Seattle, WA. June.

An evaluation of the potential risks associated with creosoted pilings and their removal. Gardiner, W., G. Pascoe, L. Muench, B. Gregg, and D. Shreffler. 2006. Abstract and presentation. Society of Environmental Toxicology and Chemistry Annual Meeting, Baltimore, MD.

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